4. TRANSIT PRIORITY CORRIDORS

The quality of transit service provided in Boston on grade-separated routes (subway and commuter rail) is generally excellent. However, service quality on surface routes (trolley and bus) is highly uneven. It is inherently more difficult to provide transit service on crowded roadways shared with motor vehicles, bicycles, and pedestrians. However, there are a number of steps that can be taken to reduce waiting time, increase operating speed, provide more comfortable and safe stations, and better inform passengers about transit service.

Improving these routes will require close collaboration between the MBTA, which operates transit service, and the City of Boston, which designs, maintains, and polices the right of way. Transit *vehicles* are a tiny fraction of street users, but transit *passengers* can account for a third to a half of the total people traveling on city streets. It is therefore important to provide *priority* to transit vehicles in the design and operation of streets in those corridors where transit is heavily used.

The Silver Line is using an exclusive lane at its Temple Place terminus near Downtown Crossing.

Priority Merge

One way of substantially reducing the delay to a bus re-entering the traffic stream is to adopt a priority merge rule. This is a section of the vehicle code that requires all vehicles to yield the right of way, when safe to do so, to buses signaling to exit a bus stop. Priority merge laws exist in Quebec, Washington, Oregon, Florida, British Columbia and California. The rule is typically advertised on the rear of buses. Even though not every vehicle will yield, the chance that at least one vehicle will yield can significantly reduce merging delay. The simplest version of the rule reads as follows:

"(1) The driver of a vehicle shall yield the right of way to a transit vehicle traveling in the same direction that has signaled and is reentering the traffic flow.

(2) Nothing in this section shall operate to relieve the driver of a transit vehicle from the duty to drive with due regard for the safety of all persons using the roadway."

Priority Lanes

Buses, trolleybuses, and light rail vehicles can travel in general traffic lanes, exclusive lanes, median reservations, or separate rights of way. For example, the C and E branch of the Green Line light rail operate in a median transit reservation. An example of a separate transit

The Silver Line operates in a bus priority lane on sections of Washington Street. The specially designed stations include kiosks, transit information, real-time Silver Line vehicle displays and other amenities.

A contraflow lane on Washington Street provides a direct connection for southbound vehicles.

right of way is the D branch of the Green Line (Riverside), which operates in a former railroad corridor. Buses can also operate in any of these types of right of way.

Priority transit lanes are designated with pavement markings and signs. They can be either with-flow or contra-flow lanes. An example of a contra-flow bus lane can be found on High Street in the downtown. The Silver Line in South Boston will include bus lanes in South Boston after the service exits the tunnel and travels to a new surface station east of D Street. Bus lanes are also included as part of the Silver Line project on Washington Street. The priority lane is reserved for transit vehicles, bicycles, and right-turning traffic. Through traffic is prohibited from operating or standing in the lane. A curb parking lane will be maintained. The sidewalk bulbs out at transit stations.

Priority lanes present enforcement challenges. Unauthorized stopping in with-flow lanes may slow transit vehicles. Contra-flow lanes are more self-enforcing, but the challenge is to insure that pedestrians understand that traffic flows in both directions.

Priority Signals

Some delay experienced by transit operating in mixed traffic or priority lanes is due to traffic signals. Giving transit vehicles priority at traffic lights can reduce transit travel time and maximize the person-carrying capacity of a street.

Automatic Vehicle Location

Some priority signal systems rely on automatic vehicle location (AVL), which provides real time location data for transit vehicles. These systems are also very useful for real-time operations control and passenger information. Most AVL systems use global positioning satellites (GPS) units located on transit vehicles. Because satellite reception can be disrupted by buildings and weather, a fixed, local transponder is used to provide a base line to correct for missing data. AVL information can be broadcast to a central unit that coordinates traffic signals and gives priority to transit vehicles. An on-board GPS determines its location and sends out a priority request as it approaches a signal.

Priority Request Systems

In a system with priority request, a transit vehicle sends an optical or radio signal as it approaches a traffic signal. The request is received and acknowledged by a transponder on the traffic signal. If the request is accepted, the signal controller either holds the green light longer or initiates an early green phase. The decision is based on the distance of the transit vehicle from the traffic signal and where the signal is in its cycle.

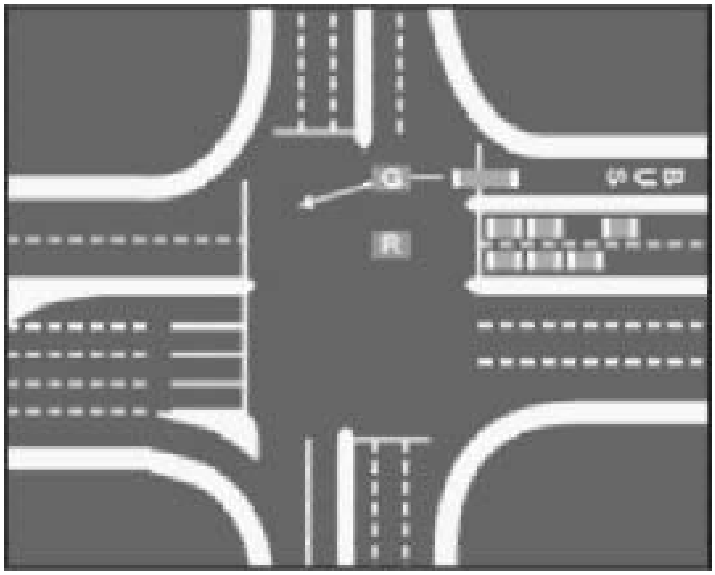
Transit priority can be linked with transit operation and traffic control centers. The GPS equipment on the vehicle sends a signal priority request to a central computer that compares the request with the route time schedule. If the bus is running behind schedule, the priority request is approved and the transit vehicle is able to pass through the intersection more quickly. Once the transit vehicle has passed through the intersection a recovery program is instituted for the traffic signal to minimize any excess cross traffic delay. If the transit vehicle is on schedule, the request is denied and the signal operates as normal. This transit signal priority strategy is best for high-frequency service where passengers do not try to meet a scheduled trip.

Queue Jumper

A queue jump lane allows transit vehicles to cut ahead of other traffic safely. The bus approaches in a bus lane or right-turn only lane. If necessary, an early green arrow is given to right-turning traffic to bring the bus to the intersection. When the bus is detected, a special signal is given to the transit vehicle before the signal turns green for general traffic. This allows the transit vehicle to proceed through the intersection before general traffic. The system requires a separate traffic signal head for the transit vehicle and a designated right-of way to store the transit vehicle at the traffic light.

Signal Progression

Improved signal progression on transit priority corridors could benefit both transit and other vehicles on the corridor, possibly with some increased delay to cross traffic. Signals should be timed based in part on transit vehicle travel time.



A queue jump lane provides an opportunity for transit vehicles to pull in front of traffic waiting at a "red" light (R) after receiving a special advanced "green " light signal (G) from the traffic controller.

Real-time bus information tells passengers when the bus will actually come, based on its current location.

Passenger Information

Passenger information is an essential component of the transit system. Even low-technology solutions can be effective. A schedule card with route information, including a strip map showing stops on the route, informs passengers about how to make their intended trip. Strip maps can be placed inside the vehicle. System maps can be provided at stops.

Estimated bus arrival times based on AVL data can be displayed on monitors or variable message signs in bus shelters. The MBTA will include this type of system as part of the Silver Line service. Systems are also available to automatically announce stops to passengers on board buses.

Stop Relocation

Bus stops in Boston are very close together on average. Rethinking the location of stops, while reducing their number, could greatly improve transit service. Fewer stops would make service both faster and smoother. Traffic signal priority works much better with far-side bus stops. For example, when bus Route 39 replaced the E trolley, the number of stops was increased from 11 to 20. Each remaining stop should be upgraded with better information, shelters and amenities.

High-quality bus shelters constructed and maintained by Wall USA have been installed on Boston streets.

Limited Stop Service

Both local and limited-stop service can be provided along the same route. For example, Route CT-1 provides limited stop service along most of the length of Route 1. Route CT-2 provides limited-stop service compared to route 47. New limited stop routes are planned as Phase 1 of the Urban Ring project. However, since MBTA local routes are short, it may be better to reduce the number of local stops on many routes, rather than providing two types of service.

Streetscape Improvements

For surface transit, the sidewalk is the station area. Streetscape improvements can enhance transit customers' experience by increasing comfort and security and providing service information. Attractive passenger shelters provide not only protection from the rain but also an improved image of transit. Shelters should be conveniently located, attractive, and graffiti-resistant. Several hundred new shelters are being installed in the City of Boston by Wall USA as part of street furniture program along major corridors in Boston.

Table 10 – Possible Transit Priority Corridors

STREET	NEIGHBORHOOD	TRANSIT SERVICE	APPROXIMATE TRANSIT RIDERS PER DAY[1]	APPROX. VEHICLES PER DAY[2]	TRANSIT SHARE[3]
Brighton Avenue	Allston	Rt 57	5,700	21,000	18%
Harvard Avenue	Allston	Rt. 66	3,500	18,000	14%
Commonwealth Avenue	Allston/Brighton	Green Line B	26,500	23,000	49%
Bunker Hill Street	Charlestown	Rt. 93	2,500	3,000	41%
Meridian Street	East Boston	Rt. 116, 117, 120, 121	6,900	15,000	28%
Huntington Avenue	Fenway & Mission Hill	Green Line E	22,700	24,000	44%
Washington Street	Roslindale	Rt. 34, 35, 36, 37, 40, 51	10,900	10,000	48%
Belgrade Avenue	Roslindale	Rt. 35, 36, 37	2,100	7,000	20%
Hyde Park Avenue	Roslindale & Hyde Park	Rt. 32	7,000	13,000	31%
Warren Street	Roxbury	Rt. 23, 28, 44	16,500	13,000	51%
Blue Hill Avenue	Dorchester, Roxbury, Mattapan	Rt. 22, 28, 45	10,700	42,000	27%
Massachusetts Avenue	South End & Back Bay	Rt. 1, CT-1, LMA	6,700	32,000	15%
Centre Street	West Roxbury	Rt. 35, 36, 37	1,600	22,000	6%

Source: MBTA ridership statistics, CTPS traffic networks and traffic data from available studies

Note:
1. Transit riders are at peak load points. Common points were used for corridors with multiple transit routes. The data were general correlated to traffic count locations.
2. Based on available data from CTPS and other sources.
3. Transit person trips were added to vehicle person trips, which were calculated by assuming a 1.1 average occupancy for vehicles per day. The transit person trips were divided by the total daily person trips on the corridor to provide an order of magnitude transit share for the corridor.

Parking and Loading Enforcement

The operation of transit priority corridors requires effective enforcement. Ticketing of illegal parkers is necessary to reduce parking that slows traffic and blocks transit stops. Adding parking meters to increase turnover of parked vehicles in commercial districts could reduce the amount of double-parking.

Potential Corridors

The city has many candidate corridors for transit priority treatments. Corridors with significant transit service are summarized in Table 10 and illustrated in Figure 16. The number of transit passengers (based on current bus ridership data from the MBTA) and the number of total vehicles (based on CTPS surveys) is shown. The share of persons in transit vehicles was calculated as the number of transit riders divided by the total number of persons, assuming an average occupancy of 1.1 for private vehicles.

The transit share percentages suggest that transit priority techniques should be considered for selected corridors. The corridors include streets with Green Line light-rail operations, Silver Line service, and high volume local bus operation. The recently initiated Silver Line bus rapid transit service along Washington Street is Boston's first experience with transit priority on city streets where fixed-rail or exclusive lanes are not utilized. The Urban Ring Phase 2, currently in the planning and environmental review stage, will also require transit priority measures.

The combination of techniques that can be used to provide transit priority in a given corridor depends on existing local factors including:

- Available street width and sidewalk width for station area amenities.
- Volume of traffic and intersection geometry
- On-street parking
- Support from right-of-way abutters
- Connections between traffic signals

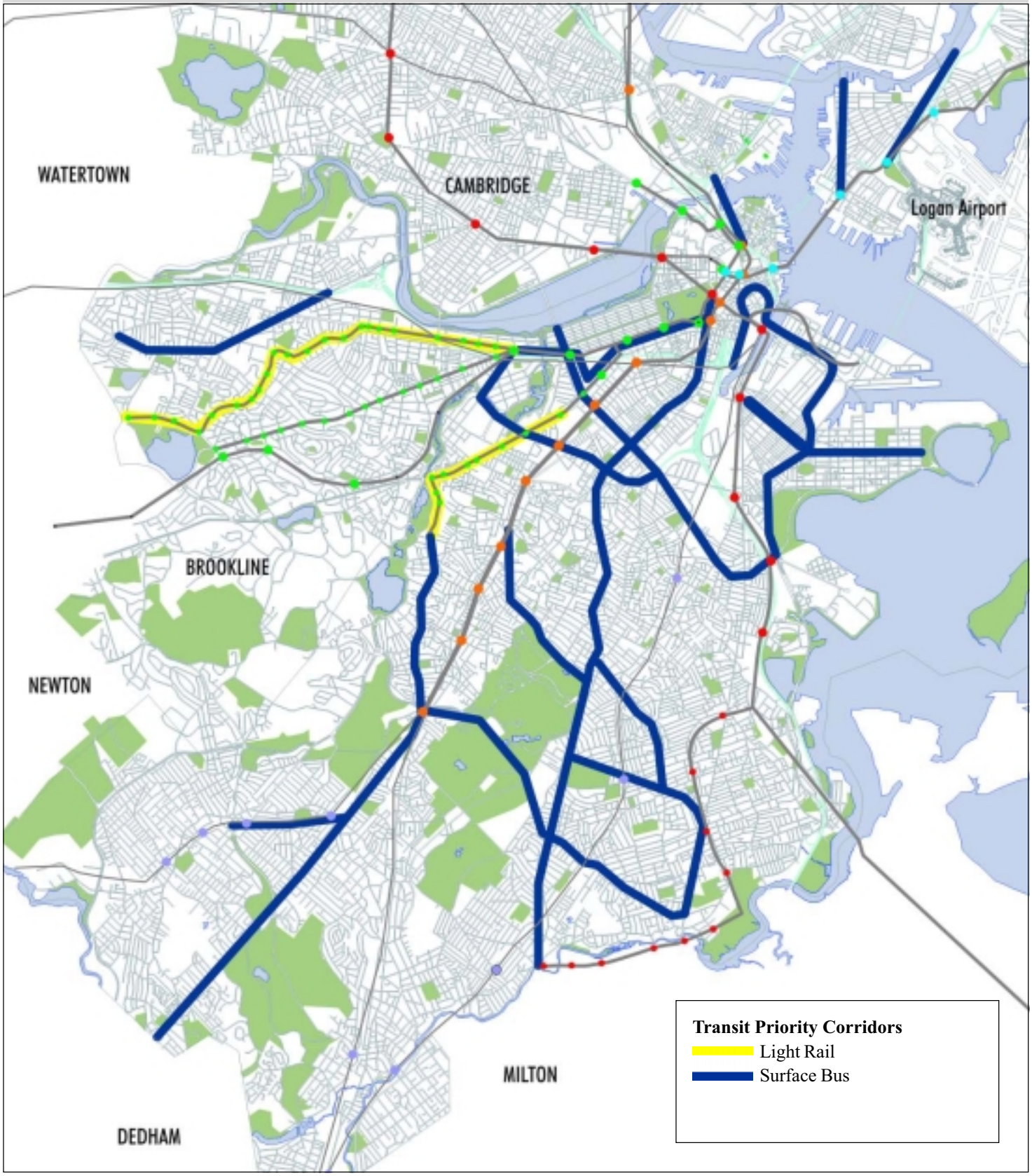


Figure 16:
Transit Priority Corridors

Action Plan:
Transit Priority Corridors

Convene a Transit Priority Corridor Task Force

BTD planners and engineers are participating in a task force with MBTA service planners to plan and implement improvements along transit priority corridors. For each identified corridor, the task force should consider better passenger information, stop relocation and consolidation, parking enforcement and regulations, operations control to reduce bunching, using AVL and real-time bus announcements, improved signal timing and progression, signal priority, and improved wayside information and amenities.

Monitor Washington Street Silver Line Effectiveness

BTD and MBTA will continue planning for deployment of signal priority, contra-flow lanes, and real-time transit information systems for the corridor. The MBTA is implementing a parking management enforcement program to deter unlawful use of the transit priority lane.

Continue Commonwealth Avenue Improvements

BTD and MBTA will continue efforts to implement a transit signal priority system for the Commonwealth Avenue corridor. Appropriate maintenance agreements need to be developed and executed as part of this effort. In the future, MBTA and BTD will investigate the implementation of real-time travel information at stations along the corridor. BTD will continue to pursue funding for the Commonwealth Avenue improvements. Signal preemption at Washington Street, Warren Street, and Packard's Corner, combined with relocation of any near side stops to far side stops, will be considered.

Increase Fines for Parking in a Transit Lane or Stop

BTD will investigate regulations forbidding standing or parking in transit priority lanes. The fine for violating this rule should be greater than the $25 to $45 fine for double parking... BTD will consider increasing the $35 fine for parking in a bus stop and also consider using brightly-colored violation stickers, to be affixed to a side rear window, stating that the vehicle is parked in violation of traffic rules.

Work with the MBTA to Design Transit Priority Applications for the Urban Ring Phase 2

As chair of the Traffic and Transportation committee guiding the Draft Environmental Impact Report/Draft Environmental Impact Statement process for the Urban Ring Phase 2, BTD will focus the group's efforts on roadway and intersection design to accommodate the proposed Bus Rapid Transit service. The selection of transit priority techniques will be part of the discussion. The BRT service will use streets and exclusive right-of-ways.

Adopt a Priority Merge Law

The City of Boston will advocate for state legislation to require that drivers yield to buses signaling to reenter the travel lane from a stop.

Advocate for Real-time Transit Information

BTD will advocate for the MBTA to disseminate information about surface transit vehicle arrivals and operations. Specific applications will be required on a corridor-by-corridor basis and at key transfer stations. The approach will need to be integrated with a broader application that includes dissemination of information over the Internet and through cellular phones and hand-held computers.

Financial District Express Bus Loop

The MBTA operates express bus routes that use South Street, High Street, Federal Street, Franklin Street, Devonshire Street, Otis Street, Kingston Street, Essex Street and the Surface Artery. Buses exit and enter the highway ramps at Kneeland Street. Local buses also operate on the loop. BTD should work with the MBTA to develop improvements to accommodate bus flows and address future circulation changes that are planned as part of the Central Artery/Tunnel project. This loop is a candidate for streetscape improvements, real-time transit information at the major Federal Street and Otis Street stops, and potential use of signal priority for transit vehicles at key intersections. The MBTA should move inbound buses from Devonshire Street to Congress Street, as proposed in Service Plan 2002.

Transit Priority Lanes on North Washington Street and Real-Time Information at Haymarket and North Station

BTD and MBTA will investigate the use of peak hour transit priority lanes including the potential use of reversible or dedicated lanes on the North Washington Street Bridge, signal priority for the corridor and real-time transit information at